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SEMITRANSPARENT DISPLAY SYSTEM

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[There are no amendments to this patent.]

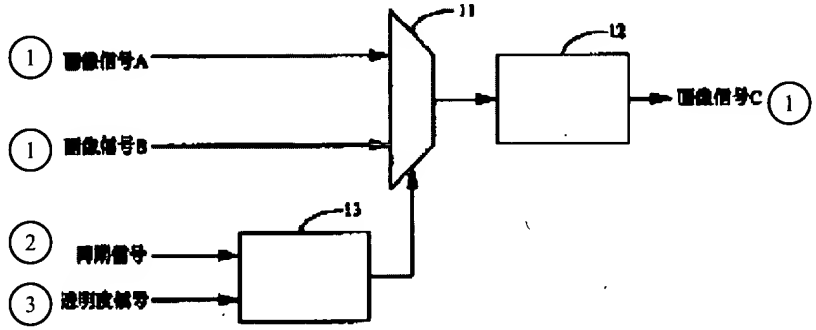
Abstract

Problem

To simplify a semitransparent synthesizing circuit for two image signals for outputting the image signals of an interlaced system.

Means to solve

A system that synthesizes images by superimposing a second image signal onto a first image signal comprises a switch part (11) for switching the first and second signals, a vertical spatial filter (12) for reducing the high-frequency components of the vertical spatial frequencies of the image signals, and a means (13) for determining the transparence degree signal that indicates the degree of transparence of the second image signal and whether the first and second image signals belong to an even-numbered or an odd-numbered field. Thus, the second image signal can be semitransparently synthesized on the first image signal with a relatively simple configuration.



Key: 1 Image signal
2 Synchronizing signal
3 Transparence degree signal

Claims

1. A system that synthesizes images by superimposing a second interlaced image signal onto a first interlaced image signal, characterized in that it comprises a switch part for selecting the first or the second image signal, a vertical special filter for reducing the high-frequency components of the vertical spatial frequencies of the output image signals of the aforementioned switch part, and a means for detecting the transparence degree signal that indicates the degree of transparence of the second image signal when it is superimposed on the first image signal and whether the first and second image signals currently belong to an even-numbered or an odd-numbered field.

2. The semitransparent display system described in Claim 1 characterized in that the aforementioned first and second image signals are both digital interlaced image signals.

3. The semitransparent display system described in Claim 1 characterized in that the aforementioned first and second image signals are both analog interlaced image signals.

4. A synthesis system that superimposes a second non-interlaced image signal onto a first non-interlaced image signal, characterized in that it comprises a switch part for selecting the first or second image signal, a vertical spatial filter for reducing the high-frequency components of the vertical spatial frequencies of the output image signal of the aforementioned switch part, a scan converter that converts the aforementioned output image signal in which the aforementioned high-frequency components have been reduced into an interlaced image signal, and a means for detecting a transparence degree signal that indicates the degree of transparence when the second image signal is superimposed onto the first image signal and whether the first and second image signals currently belong to an even-numbered or an odd-numbered horizontal scan line.

5. The semitransparent display system described in Claim 4 characterized in that the aforementioned first and second image signals are both digital non-interlaced image signals.

6. The semitransparent display system described in Claim 4 characterized in that the aforementioned first and second image signals are both analog non-interlaced image signals.

Detailed explanation of the invention

[0001]

Technical field of the invention

The present invention relates to a semitransparent synthesizing circuit for two signals for outputting the image signals of an interlaced system.

[0002]

Prior art

In recent years, there has been active research and development of multimedia equipment that utilize a household TV as an information terminal. In this case, it is necessary for video, text, etc., to be displayed superimposed on the TV screen.

[0003]

Up to now, displays that superimpose text image signals created with a graphic system, etc., on video image signals such as to display a simple menu screen have often been used, but very recently, the necessity for a semitransparent display capability where the background image is visible through [the foreground], such as when a broadcast station logo is shown, for example, has arisen. A transparent display can be realized by synthesizing an image signal as the background

and an image signal displayed as the foreground at a ratio of 0.5:0.5, and those that enable such transparent synthesis include Japanese Utility Model No. Hei 1[1989]-95875. With this, a transparent synthesis is realized by multiplying the two image signals to be synthesized by a coefficient and then adding the two.

[0004]

Below, the abovementioned conventional example will be explained briefly while referring to a figure. Figure 3 is a block diagram showing the constitution of the conventional example. In Figure 3, (31) and (32) are multiplication circuits, and (33) is an addition circuit. Here, when a signal in which image signal A and image signal B are semi-transparently synthesized is to be output as image signal C, if 0.5 is given for both coefficient signal A and coefficient signal B, image signal C is obtained where image signals A and B are synthesized at a ratio of 0.5:0.5 and the objective can be achieved.

[0005]

Problems to be solved by the invention

However, with the aforementioned system, because two multiplication circuits and one addition circuit are used, there is the problem that the scale of the circuitry required will be large.

[0006]

The objective of the present invention, in consideration of the aforementioned problems, is to provide a system for semi-transparently synthesizing two images with a relatively simple constitution.

[0007]

Means to solve the problems

The semitransparent display system that synthesizes images by superimposing a second interlaced image signal on a first interlaced image signal of the invention described in Claim 1 is characterized in that it comprises a switch part for selecting a first or a second image signal, a vertical special filter for reducing the high-frequency components of the vertical spatial frequencies of the output image signal of the aforementioned switch part, and a means for detecting the transparence degree signal that indicates the degree of transparence of the second image signal when it is superimposed on the first image signal and whether the first and second image signals currently belong to an even-numbered or an odd-numbered field.

[0008]

The semitransparent display system in the invention described in Claim 2 is characterized in that, in addition to the characteristics of the first semitransparent display system, the first and second image signals are both digital interlaced image signals.

[0009]

The semitransparent display system in the invention described in Claim 3 is characterized in that, in addition to the characteristics of the first semitransparent display system, the first and second image signals are both analog interlaced image signals.

[0010]

The semitransparent display system that synthesizes by superimposing a second non-interlaced image signal onto a first non-interlaced image signal of the invention described in Claim 4 is characterized in that it comprises a switch part for selecting the first or second image signal, a vertical spatial filter for reducing the high-frequency components of the vertical spatial frequencies of the output image signal of the aforementioned switch part, a scan converter that converts the aforementioned output image signal in which the aforementioned high-frequency components have been reduced into an interlaced image signal, and a means for detecting the transparence degree signal that indicates the degree of transparence when the second image signal is superimposed onto the first image signal and whether the first and second image signals currently belong to an even-numbered or an odd-numbered horizontal scan line.

[0011]

The semitransparent display system in the invention described in Claim 5 is characterized in that, in addition to the characteristics of the fourth semitransparent display system, the first and the second image signals are both digital non-interlaced image signals.

[0012]

The semitransparent display system in the invention described in Claim 6 is characterized in that, in addition to the characteristics of the fourth semitransparent display system, the first and the second image signals are both analog non-interlaced image signals.

[0013]

Embodiment of the invention

With the semitransparent display system in the invention described in Claim 1, 2 or 3, when the transparence degree signal indicates transparence, the switch part selects the first

interlaced image signal, and when non-transparence is indicated, the second interlaced image signal is selected. When the transparence degree signal indicates semitransparence, whether the first and the second image signals currently belong to an even-numbered or an odd-numbered field is determined. With an even-numbered field, the first or second image signal is selected, and with an odd-numbered field, the image signal of the first and second image signals that was not associated with the even-numbered field is selected. Then, the image signal selected by the switch part is output with the high-frequency components of the vertical spatial frequencies reduced by the vertical spatial filter.

[0014]

With the semitransparent display system of the invention described in Claim 4, 5 or 6, when the transparence degree signal indicates transparence, the switch part selects the first non-interlaced image signal. When non-transparence is indicated, the second non-interlaced image signal is selected. When the transparence degree signal indicates semitransparence, whether the first and the second image signals currently belong to an even-numbered or an odd-numbered horizontal scan line is determined. With an even-numbered scan line, the first or second image signal is selected, and with an odd-numbered scan line, the image signal of the first and second image signals that was not associated with the even number scan line is selected. The image signal selected by the switch part is then converted into interlaced image signal by the scan converter and is output with the high-frequency components of the vertical spatial frequencies further reduced by the vertical spatial filter.

[0015]

Application examples

Application Example 1

An application example of the semitransparent display system of the present invention will be explained below with reference to a figure.

[0016]

Figure 1 is a block diagram showing the overall constitution of the first application example of the present invention. In Figure 1, image signal A and image signal B are the digitized interlaced image signal inputs that are synchronized with each other. The synchronizing signal is input in common to image signals A and B. The transparence degree signal is a signal input that indicates three levels of transparence of image signal B when image signal B is to be superimposed on image signal A, transparent, semitransparent, or non-transparent, in units of pixels. Switch part (11) selects image signal A or B in units of pixels. Vertical spatial filter (12) reduces the

high-frequency components of the vertical spatial frequencies of the image signal selected by switch part (11). Switch control part (13) determines whether switch part (11) should select image signal A or B in units of pixels according to the transparence degree signal and the synchronizing signal.

[0017]

The operation of a constitution described above will now be explained with reference to Figure 1. First, when the transparence degree signal indicates transparence, switch control part (13) controls switch part (11) to select image signal A. When the transparence degree signal indicates non-transparence, switch control part (13) controls switch part (11) to select image signal B. In addition, when the transparence degree signal indicates semitransparence, switch control part (13) senses whether image signals A and B currently belong to an even-numbered or an odd-numbered field based on the synchronizing signal. With an even-numbered field, it controls switch part (11) to select image signal A, and with an odd-numbered field, it controls switch part (11) to select image signal B.

[0018]

Since switch control part (13) controls switch part (11) as described above, when the transparence degree signal indicates semitransparence, switch part (11) alternately selects and outputs image signals A and B for each field, so that image signal A and B appear to be semi-transparently synthesized due to the persistence effect of human vision. However, up to now, when the difference in brightness between image signals A and B is large, flickering occurs, causing the viewer annoyance. Thus, the occurrence of flickering is prevented by reducing the high-frequency components of the vertical spatial frequencies of the image signals output by switch part (11) with vertical spatial filter (12).

[0019]

It is possible to semitransparently synthesize two interlaced image signals with a relatively simple configuration using the aforementioned operation.

[0020]

Here, in this application example, the case was explained in which, when the transparence degree signal indicates semitransparence, when image signals A and B belong to an even-numbered field, image signal A is selected, and when an odd-numbered field, image signal B is selected, but there would be the same effect if signal A were selected when they belong to an odd-numbered field and image signal B were selected when they belong to an even-numbered field.

There is also the same effect when the correlation between even- and odd-numbered fields and image signals A and B is changed at fixed time intervals.

[0021]

Also, with this application example, an example was explained using a vertical spatial filter of a type that reduces the high-frequency components of the vertical spatial frequency of the image signals, but there is the same effect when another filter based on a system that reduces line flicker in interlaced image signals is used instead.

[0022]

In addition, in this application example, an example was explained using digital interlaced image signals as the input, but there is the same effect when analog interlaced image signals are used as the input.

[0023]

Application Example 2

A second application example of a semitransparent display system of the present invention will be explained below with reference to a figure.

[0024]

Figure 2 is a block diagram showing the overall constitution in the second application example of the present invention. In Figure 2, image signal A and image signal B are digitized non-interlaced image signal inputs that are synchronized with each other. The synchronizing signal is input in common to image signals A and B. The transparence degree signal is a signal input that indicates three levels of transparence of image signal B when image signal B is to be superimposed on image signal A, transparent, semitransparent, or non-transparent, in units of pixels. Switch part (21) selects image signal A or B in units of pixels. Scan converter (22) converts non-interlaced image signals into interlaced image signals. Vertical spatial filter (23) reduces the high-frequency components of the vertical spatial frequencies of the image signal that have been converted into the interlaced type by scan converter (22). Switch control part (24) determines whether switch part (21) should select image signal A or B in units of pixels according to the transparence degree signal and the synchronizing signal.

[0025]

The operation of the constitution described above will now be explained with reference to Figure 2. First, when the transparence degree signal indicates transparence, switch control part

(24) controls switch part (21) to select image signal A. When the transparence degree signal indicates non-transparence, switch control part (24) controls switch part (21) to select image signal B. Additionally, when the transparence degree signal indicates semitransparence, switch control part (24) senses whether image signals A and B currently belong to an even-numbered or an odd-numbered scan line based on the synchronizing signal. With an even-numbered horizontal scan line, it controls switch part (21) to select image signal A, and with an odd-numbered scan line, it controls switch part (21) to select image signal B.

[0026]

Next, the image signal output by switch part (21) is converted into an interlaced image signal by scan converter (22), and with the interlaced image signal obtained at this point, when the transparence degree signal indicates semitransparence, image signals A and B are alternately selected and output for each field, so that image signals A and B appear to be semitransparently synthesized due to the persistence effect of human vision. However, up to now, when the difference in brightness between image signals A and B is large, flickering occurs, causing the viewer annoyance. Thus, the occurrence of flickering is prevented by reducing the high-frequency components of the vertical spatial frequencies of the interlaced image signals with vertical spatial filter (23).

[0027]

It is possible to semitransparently synthesize two interlaced image signals with a relatively simple configuration by using the operation described above.

[0028]

Here, in this application example, the case was explained in which, when the transparence degree signal indicates semitransparence, when image signals A and B belong to an even-numbered horizontal scan line, image signal A is selected, and when they belong to an odd-numbered horizontal scan line, image signal B is selected, but there would be the same effect if signal A were selected when they belong to an odd-numbered horizontal scan line and image signal B were selected when they belong to an even-numbered horizontal scan line. There is also the same effect when the correlation between even- and odd-numbered scan lines and image signals A and B is changed at fixed time intervals.

[0029]

Also, in this application example, an example was explained using a vertical spatial filter downstream of the scan converter, but on the other hand there would be the same effect if a scan converter were used downstream of the vertical spatial filter.

[0030]

Also, in this application example, the example was explained using a vertical spatial filter of a type that reduces the high-frequency components of the vertical spatial frequencies of the image signals, but there is the same effect if another filter based on a system that reduces line flicker in interlaced image signals were used instead.

[0031]

In addition, with this application example, the example was explained using digital interlaced image signals as the input, but there would be the same effect if analog interlaced image signals were used as the input.

[0032]

Effects of the invention

With the semitransparent display system of the invention described in Claim 1, 2 or 3 of the present invention, it is possible to semitransparently synthesize two interlaced image signals with a relatively simple configuration.

[0033]

And with the semitransparent display system in the invention described in Claim 4, 5 or 6 of the present invention, it is possible to semitransparently synthesize two non-interlaced image signals for outputting the image signals of an interlaced system.

Brief description of the figures

Figure 1 is a block diagram showing the constitution of a first application example of the present invention.

Figure 2 is a block diagram showing the constitution of a second application example of the present invention.

Figure 3 is a block diagram showing the constitution of a conventional example.

Explanation of symbols

11, 21	Switch part
12, 23	Vertical spatial filter
13, 24	Switch control part
22	Scan converter
31, 32	Multiplication circuit
33	Addition circuit

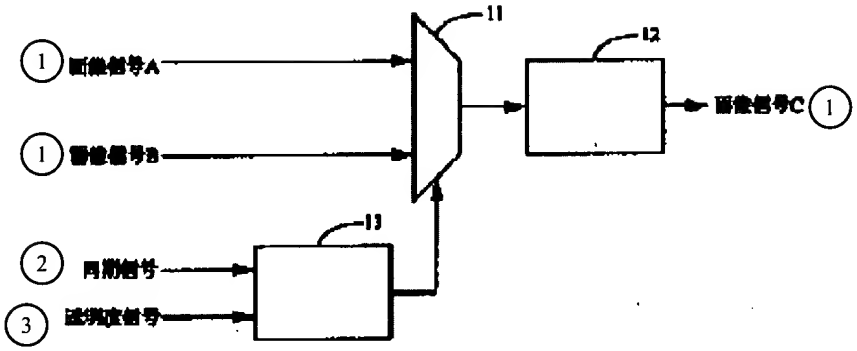


Figure 1

Key: 1 Image signal A
2 Synchronizing signal
3 Transparence degree signal

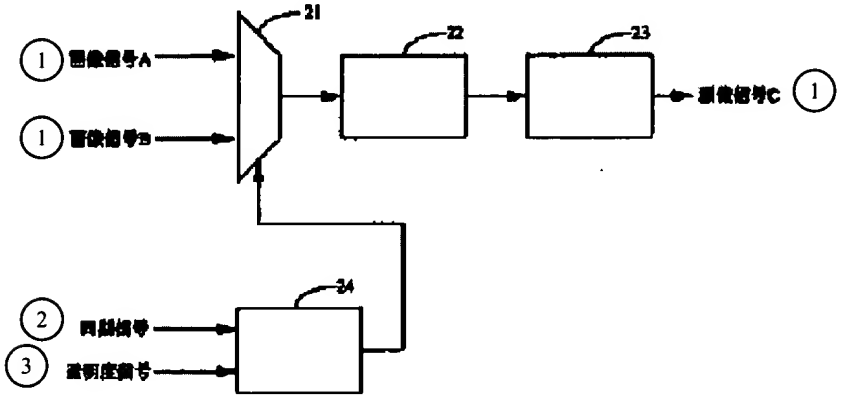


Figure 2

Key: 1 Image signal
2 Synchronizing signal
3 Transparence degree signal

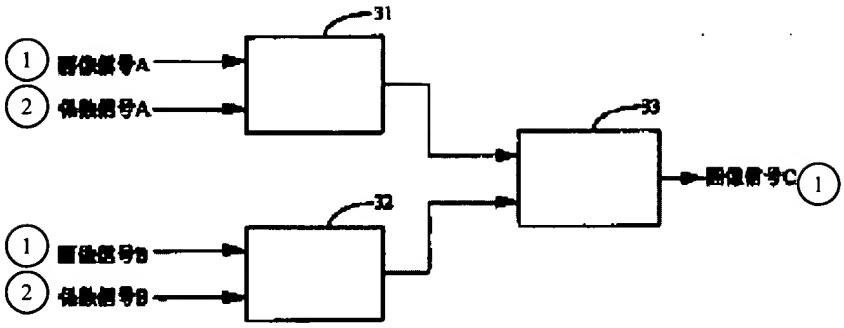


Figure 3

Key: 1 Image signal
2 Coefficient signal